

2003 Conference on Selective Catalytic Reduction and Non-Catalytic Reduction for NO_x Control



Pittsburgh, Pennsylvania
October 29-30, 2003



Wednesday, October 29, 2003

- 7:00 am **Registration/Continental Breakfast**
- 7:50 am **Welcoming Remarks and Introduction of Keynote Speaker**
Thomas A. Sarkus, Conference Chair
Division Director, Coal Power Projects Division
U.S. Department of Energy, National Energy Technology Laboratory
- 8:00 am **Keynote Address**
Robert W. McIlvaine, President, McIlvaine Company

EMISSIONS CONTROL STRATEGIES

MODERATOR: JAMES STAUDT, ANDOVER TECHNOLOGY PARTNERS

- 8:30 am Status of NO_x Regulations in the United States
Kevin Culligan, U.S. Environmental Protection Agency
- 8:55 am NO_x and Multi-Pollutant Compliance Strategies in Light of Regulatory and Market Uncertainties
Rui F. Afonso, Energy and Environmental Strategies
- 9:20 am PRIER - A Tool for Planning Multi-Pollutant Control Strategies
Richard Booth and **George H. Warriner**, URS Corporation
Gordon Page, Independent Consultant
Leo E. Makovsky, U.S. Department of Energy, National Energy Technology Laboratory
- 9:45 am **Break**

COMMERCIAL APPLICATIONS OF SELECTIVE CATALYTIC REDUCTION (SCR)

- 10:15 am Case Studies of Some Typical SCR Commissioning Issues and Their Resolutions
Anupam Sanyal, International Environmental & Energy Consultants, Inc.
- 10:40 am Specifying, Achieving, and Measuring Mixing Quality for SCR Systems
Thomas F. Robinson, Babcock Power Environmental Inc.
Rajaram Jambhekar and **Clayton A. Erickson**, RileyPower Inc.
- 11:05 am Popcorn Ash at Georgia Power Company's Plant Bowen; Experiences and Removal Strategies
Marie L. Craig, Southern Company Services, Inc.
Larry C. Bohannon, Georgia Power Company Plant Bowen
K. Weigl, ENVIRGY Environment Energy Engineering and Construction GmbH
C. Ayers, ENERFAB Inc.
- 11:30 am **Lunch (on your own)**
- 12:30 pm **Poster Session**

SCR CATALYST DEACTIVATION & REGENERATION

MODERATOR: ANUPAM SANYAL, INTERNATIONAL ENVIRONMENTAL & ENERGY CONSULTANTS, INC.

- 1:00 pm SCR Deactivation Mechanisms Related to Alkali and Alkaline Earth Elements
Constance Senior, **T. Linjewile**, and **M. Bockelie**, Reaction Engineering International
L. Baxter, **C. Bartholomew**, and **W. Hecker**, Brigham Young University
K. Whitty and **E. Eddings**, University of Utah

Wednesday, October 29, 2003 (continued)

- 1:25 pm Deactivation Mechanisms of SCR Catalysts During the Co-Combustion of Bio-Residues
Jens Beck, *Sven Unterberger*, and *Klaus R.G. Hein*, Institut für Verfahrenstechnik und Dampfkesselwesen (IVD), Universität Stuttgart
- 1:50 pm The Effect of Co-Firing Large Amounts of Secondary Fuels on SCR Deactivation
Leo H.J. Vredenburg and *Ronald Meijer*, KEMA
- 2:15 pm Full-Scale Catalyst Regeneration Experience of a Coal-Fired US Merchant Plant
Douglas W. Bullock, National Energy & Gas Transmission, Inc.
Hans Hartenstein, SCR-Tech LLC
- 2:40 pm **Break**

SCR CATALYST MANAGEMENT

- 3:05 pm Bench-Scale SCR Catalyst Testing for Long-Term Management and Troubleshooting
W. Scott Hinton, Southern Research Institute
- 3:30 pm SCR Catalyst Management Strategies - Modeling and Experience
James E. Staudt, Andover Technology Partners
Anthony J. Engelmeyer, Orlando Utilities Commission
- 3:55 pm Predictive Tool for Cost Reduction of SCR Installations (By Optimising Process Operation)
Leo H.J. Vredenburg, *P. Van Woessik*, and *R. Meijer*, KEMA

EFFECTS OF MERCURY ON SCR CATALYSTS

- 4:20 pm Effects of a Mercury Oxidant on SCR Catalysts for PRB Coal
Rene Mangal, Kinectrics
B.R. Seckington, Ontario Power Generation
K. Zanganeh and *R. Dureau*, CANMET Energy Technology Center
- 4:45 pm Evaluation of Mercury Emissions from Coal-Fired Facilities with SCR-FGD Systems
Jeffrey A. Withum, *S.C. Tseng*, and *J.E. Locke*, CONSOL Energy
- 5:10 pm **Adjourn***

Thursday, October 30, 2003

- 7:00 am **Registration/Continental Breakfast**

REAGENT PREPARATION AND MIXING

MODERATOR: KEITH HARRISON, SOUTHERN COMPANY

- 7:30 am Mixing Performance Characterization for Optimization and Development on SCR Applications
Kevin J. Rogers, The Babcock & Wilcox Company
- 7:55 am Gas-Gas Mixing Applied to SCR Systems
Mughis Naqvi and **Chris Meyer**, Sulzer Chemtech USA Inc.
- 8:20 am Advanced SCR Control for Dynamic Ammonia Distribution
Scott A. Boyden and *Larry Czarnecki*, ALSTOM Power
Stephen Piche, Pegasus Technologies
- 8:45 am Aqueous Ammonia Stripping Technology for SCR Applications
John Elston and *Dileep Karmarkar*, Foster Wheeler Power Group
- 9:10 am **Break**

COMMERCIAL APPLICATIONS OF SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

- 9:35 am Improved Rich Reagent Injection (RRI) Performance for NO_x Control in Coal Fired Utility Boilers
Marc A. Cremer and *Huafeng D. Wang*, Reaction Engineering International
David E. Boll, AmerenUE
Edmund Schindler, RJM Corporation
Edmundo Vásquez, SmartBurnSM, RMT, Inc., Alliant Energy Corporation

*After adjournment Bruce Lani, U.S. Department of Energy, National Energy Technology Laboratory, will lead a brief discussion on the status of NETL's NO_x control program and upcoming solicitation. All those interested are invited to stay.

Thursday, October 30, 2003 (continued)

- 10:00 am Injection of Urea through the Rotamix System to Obtain Improved NO_x Reduction
John Ralston and **Edwin Haddad**, Mobotec USA

OXIDATION OF SO₂ TO SO₃ ACROSS SCR CATALYSTS

- 10:25 am Sulfuric Acid Emissions from Coal-Fired Boilers
Edward K. Levy and **Nenad Sarunac**, Energy Research Center, Lehigh University
- 10:50 am On the Relative Importance of SO₂ Oxidation to High Dust SCR DeNO_x Units
Morten Thellefsen Nielsen, Haldor Topsøe A/S
- 11:15 am SCR Operation Optimization: SO₃ Removal to Optimize Catalyst Life and NH₃ Distribution in Wastewater
Thomas L. Wright, Parsons Energy & Chemicals Group, Inc.
Richard T. Wilburn, University of North Carolina at Chapel Hill
- 11:40 am Chemical Process Technologies for Simultaneous NO_x Removal in Existing FGD Installations
William Ellison, Ellison Consultants
- 12:05 pm **Lunch (on your own)**
- 1:00 pm **Poster Session**

NON-COAL APPLICATIONS OF NO_x REDUCTION TECHNOLOGIES

MODERATOR: TODD SOMMER, PROMECON USA

- 1:30 pm Development of the NO_xNON 700-HT Catalyst for Simple Cycle Gas Turbines
Kazuhiro Yano and **Masayoshi Ichiki**, Hitachi Zosen Corporation
Presenter: Peter Higgins, Hitachi Zosen Engineering U.S.A. Ltd.
- 1:55 pm Selective Catalytic Reduction for Diesel Engines in Stationary Power and Transportation Applications
Robert S. Weber, **Michael D. Jackson**, and **Charles E. Benson**, TIAX LLC
- 2:20 pm Low NO_x Continuous Emissions Measurements from Gas Turbines
Allan L. Budd and **Tom Baldwin**, Baldwin Inc.
- 2:45 pm **Break**

ALTERNATIVE NO_x CONTROL TECHNOLOGIES

- 3:00 pm Innovative NO_x Control Technologies Can Eliminate an SCR
Ravi Krishnan, RJM Corporation
- 3:25 pm NO_xStarJ Plant Demonstration
Keith W. Morris, Mitsui Babcock (US) LLC
G. Hesselmann, Mitsui Babcock, United Kingdom
- 3:50 pm Current Status of Coal Preheating Technology Development for NO_x Reduction from Pulverized Coal-Fired Boilers
Serguei Nester, **Bruce Bryan**, **Stan Wohadlo**, and **Joseph Rabovitser**, Gas Technology Institute
- 4:15 pm **Close**



Pittsburgh Marriott City Center

Poster Presentations

SCR Inlet NO_x Monitoring for Real-Time SCR Control — **Aron Gaus** and *Joel Brand*, Brand-Gaus, LLC

Innovative NO_x Control Technologies — **David L. Wojichowski**, De-NOX Technologies, LLC

Control Systems for Long Term Field Testing Applications — **Dave Swensen** and *Darren Shino*, Reaction Engineering International

Multipollutant Control by Evaporative Cooling/Flash Drying Technology and Electrostatically Enhanced Fabric Filtration — **Ravi Krishnan**, RJM Corporation

Characterization of Two Fluid Nozzles for NO_x Control Applications — *Rudolf J. Schick* and *Keith F. Knasiak*, Spraying Systems Co.

Presenter: Wes Bartell, Spraying Systems Co.

Use of ROFA to Improve the Operation of a SCR System — *John Ralston* and **Edwin Haddad**, Mobotec USA

Acoustic Cleaners on SCR Reactors — **Jake Shelton**, BHA Group, Inc.

Deactivation Mechanisms of SCR Catalysts During the Co-Combustion of Bio-Residues — **Jens Beck**, *Sven Unterberger*, and *Klaus R.G. Hein*, Institut für Verfahrenstechnik und Dampfkesselwesen (IVD), Universität Stuttgart

SCR Impact on Mercury Speciation in Coal-Fired Boilers — *Ravi K. Srivastava* and **Chun W. Lee**, U.S. Environmental Protection Agency; *S. Behrooz Ghorishi*, ARCADIS Geraghty & Miller, Inc.; **Thomas W. Hastings** and *Frank M. Stevens*, Cormetech, Inc.

Integrated Optimization of Combustion and Post-Combustion Systems for Coal-Fired Boilers — *Daniel Kohn* and *Rob James*, NeuCo, Inc.; *Soung S. Kim*, U.S. Department of Energy, National Energy Technology Laboratory

Presenter: Peter Spinney, NeuCo, Inc.

Pin PilesSM: Foundations for SCR Retrofits — **Martin G. Taube**, Nicholson Construction Company

SCR Catalyst Management Strategies - Modeling and Experience — **James E. Staudt**, Andover Technology Partners; *Anthony J. Engelmeyer*, Orlando Utilities Commission

Advanced SCR Control for Dynamic Ammonia Distribution — **Scott A. Boyden** and *Larry Czarnecki*, ALSTOM Power; *Stephen Piche*, Pegasus Technologies

Ammonia-On-Demand⁷ Installations at American Electric Power's Clifty Creek and Kyger Creek Plants Produce Improved Availability and Safer Operations — **Hamilton Walker, Jr.** and *James J. Ferrigan*, Hera LLC

Field Application of On-Line Coal Flow Balancing Technology — **Harun Bilirgen** and *Edward K. Levy*, Energy Research Center, Lehigh University